Transportation and the Economy

Transportation exists in every phase and facet of life today. It is responsible for the high degree of mobility enjoyed by Americans and the nearly unrestrained flow of goods among the many cities and towns of the United States. It connects the country geographically, enables regional specialization, and links spatially separated activities into an economic system. Because of this, transportation plays a vital role in the American economy.

This chapter focuses on the economic performance of the U.S. transportation system. First, it discusses measures of transportation's importance to the economy, including its economic magnitude relative to other societal functions and its scale as an industrial activity. Then, it discusses the importance of transportation to American households through analysis of consumer expenditures on transportation and their trends over time. The chapter also examines government revenues from, and expenditures on, transportation and reviews employment and labor productivity in transportation industries.

MEASURING TRANSPORTATION'S ECONOMIC IMPORTANCE

The economic importance of transportation to society can be measured from a consumption or production perspective. From the consumption perspective, it is measured by the amount of money society spends for transportation purposes. In the national accounts,[1] which are used to estimate aggregate economic activity, consumer and government expenditures (including investment) for transportation, plus the value of transportation investments (e.g., trucks and other vehicles purchased by businesses), are called transportation-related final demand.

From the production perspective, it is measured by the value generated by transportation services in moving people and goods on the transportation system. These services include both for-hire and in-house transportation.

Transportation-Related Final Demand in GDP

Transportation-related final demand is a net measure of one sector of the economy, while Gross Domestic Product (GDP)[2] is a net measure of all sectors of the economy. As presented in the national accounts, the two measures are internally consistent. Both measure the production, and not the consumption, of the economy, since they include products that are exported and thus not consumed domestically, and exclude those that are imported and thus consumed here. Also, they are measures of net economic output, not gross output, because intermediate output or business operation expenditures, such as motor fuels, tires, and accounting services, are excluded from both.

In current dollars, transportation-related final demand totaled about $847 billion in 1996, or about 11 percent of GDP (see table 2-1). Personal consumption is the primary component of transportation-related final demand, accounting for 71 percent of the total. Gross private domestic investment and government transportation-related purchases were 16.5 percent and 17.3 percent, respectively.

International trade in transportation-related goods and services consistently ran a deficit from 1992 to 1996, primarily as a result of lackluster automobile and parts trading. In 1996, this deficit was $42.3 billion, slightly lower than the previous year (see table 2-2). In contrast, civilian aircraft and parts trade ran a surplus, with exports about three times imports. Without this surplus, the transportation-related trade deficit would have been even larger (USDOC BEA 1997). With international trade, what an economy produces and what it consumes may differ significantly, because some portion of domestic demand is supplied by imports and some portion of a country's products are exported. The difference between the two is the net international trade of transportation-related goods and services, which in 1996 was negative (i.e., more imports than exports). Because the United States imported more transportation-related goods and services than it exported, the sum of the shares of personal consumption, gross private domestic investment, and government purchases in transportation-related final demand was greater than $847 billion in 1996.

In the national accounts, a country's domestic final demand, that is, the sum of personal con-

[1] The national accounts are a set of macroeconomic accounts, balance sheets, and tables based on a set of internationally agreed upon concepts, definitions, classifications and accounting rules. They provide an accounting framework within which economic data can be compiled and presented in a format designed for economic analysis.

[2] GDP is defined as the net output of goods and services produced by labor and property located in the United States, valued at market prices. As long as the labor and property are located in the United States, the suppliers (workers and owners) may be either U.S. residents or residents of foreign countries.

Table 2-1.
Summary Table: Final Demand and Gross Domestic Demand for Transportation-Related Goods and Services in the U.S. Economy: 1992–96

Current dollars (in billions)	1992	1993	1994	1995	1996
Gross Domestic Product (GDP)	6,244.4	6,558.1	6,947.0	7,265.4	7,636.0
Transportation-related final demand[1]	669.4	709.1	760.2	798.7	846.6
Transportation-related final demand in GDP	10.7%	10.8%	10.9%	11.0%	11.1%
Gross Domestic Demand (GDD)	6,273.9	6,618.8	7,037.9	7,351.4	7,730.8
Transportation-related domestic demand[2]	684.9	734.9	798.7	841.5	888.9
Transportation-related domestic demand in GDD	10.9%	11.1%	11.3%	11.4%	11.5%
Chained 1992 dollars[3] (in billions)	**1992**	**1993**	**1994**	**1995**	**1996**
Gross Domestic Product	6,244.4	6,389.6	6,610.7	6,742.1	6,928.4
Transportation-related final demand[1]	669.4	690.8	723.2	739.9	763.0
Transportation-related final demand in GDP	10.7%	10.8%	10.9%	11.0%	11.0%
Gross Domestic Demand	6,274.0	6,458.0	6,712.7	6,837.5	7,037.7
Transportation-related domestic demand[2]	684.9	716.8	759.5	778.6	801.6
Transportation-related domestic demand in GDD	10.9%	11.1%	11.3%	11.4%	11.4%

[1] Demand for goods and services produced in the United States, regardless of where they are consumed. The measure counts exported goods and services, but does not include imports.
[2] Demand for goods and services consumed in the United States, regardless of where they are produced. The measure counts imported goods and services, but does not include exports.
[3] The Bureau of Economic Analysis derives chained dollars by using the Fisher Ideal Quantity Index to calculate changes between adjacent years. Annual changes are then chained (multiplied) together to form a time series.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculated from data in U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business,* 1997, various issues.

sumption, gross private domestic investment, and government purchases, is called Gross Domestic Demand (GDD), to distinguish it from final demand for the products of the economy. GDD includes imports, but excludes exports, thus counting only what is consumed, purchased, or invested in the United States. In 1996, U.S. transportation-related GDD was about $889 billion.

This demand can be directly compared with total U.S. GDD to measure the importance of transportation in U.S. domestic demand. From 1992 to 1996, the share of transportation-related domestic demand in U.S. GDD increased from 10.9 percent to 11.5 percent. During the same period, the share of transportation-related final demand in GDP increased from 10.7 percent to 11.1 percent. A larger portion of U.S. domestic demand for transportation was supplied by foreign production in 1996 than in 1992 (USDOC BEA 1997). Figure 2-1 presents the components of U.S. domestic demand for transportation in 1996.

► Comparison with Other Functions

The 11.1 percent share of transportation-related final demand in GDP, as well as the 11.5 percent share of transportation domestic demand in GDD, provide measures of the role that transportation plays in the economy. The relative importance of transportation in an economy can also be seen by comparing it with the five major societal functions for which goods and

Table 2-2a.
Transportation-Related Components of U.S. GDP and GDD: 1992–96
(In billions of current $)

	1992	1993	1994	1995	1996
Transportation-related final demand[1]	669.4	709.1	760.2	798.7	846.6
Transportation-related domestic demand[2]	684.9	734.9	798.7	841.5	888.9
Personal consumption of transportation	471.6	504.0	542.2	572.3	602.3
Motor vehicles and parts	206.9	226.2	246.6	254.8	261.3
Gasoline and oil	106.6	107.6	109.4	114.4	122.6
Transportation services	158.1	170.2	186.2	203.1	218.4
Gross private domestic investment	89.9	104.0	122.9	130.1	140.1
Transportation structures	3.7	4.1	4.3	4.4	5.6
Transportation equipment	86.2	99.9	118.6	125.7	134.5
Net exports of transportation-related goods and services	–15.5	–25.8	–38.5	–42.8	–42.3
Exports (+)	125.0	124.9	131.3	134.4	143.6
Civilian aircraft, engines, and parts	37.7	32.7	31.5	26.1	30.8
Automotive vehicles, engines, and parts	47.0	52.5	57.8	61.8	65.0
Passenger fares	16.6	16.6	17.1	19.1	20.6
Other transportation	23.7	23.1	24.9	27.4	27.2
Imports (–)	140.5	150.7	169.8	177.2	185.9
Civilian aircraft, engines, and parts	12.6	11.3	11.3	10.7	12.7
Automotive vehicles, engines, and parts	91.8	102.4	118.3	123.8	128.9
Passenger fares	10.6	11.3	12.9	14.4	15.8
Other transportation	25.5	25.7	27.3	28.3	28.5
Government transportation-related purchases	123.4	126.9	133.6	139.1	146.5
Federal purchases	16.8	17.6	18.8	17.9	18.7
State and local purchases	95.3	99.8	106.5	112.4	118.8
Defense-related purchases	11.3	9.5	8.2	8.8	9.0

[1] Demand for goods and services produced in the United States, regardless of where they are consumed. The measure counts exported goods and services, but does not include imports.
[2] Demand for goods and services consumed in the United States, regardless of where they are produced. The measure counts imported goods and services, but does not include exports.

KEY: GDP = Gross Domestic Product; GDD = Gross Domestic Demand.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculated from data in U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, 1997, various issues.

services are produced: housing, health care, food, transportation, education, and "other," which includes all other functions. Table 2-3 shows the value and share in GDP of each of these functions.

Ranked according to their shares in GDP, housing was the largest component of U.S final demand in 1996, health care was second, food was third, and transportation was fourth. This ranking has not changed since 1991, although there have been some slight changes in relative shares over the period.

Transportation Satellite Accounts

The role of transportation services in the U.S. economy has long been underrepresented in national economic data used by government and private sector decisionmakers. One reason is

Table 2-2b.
Transportation-Related Components of U.S. GDP and GDD: 1992–96
(In billions of chained[1] 1992 $)

	1992	1993	1994	1995	1996
Transportation-related final demand[2]	669.4	690.8	723.2	739.9	763.0
Transportation-related domestic demand[3]	684.9	716.8	759.5	778.6	801.6
Personal consumption of transportation	471.6	490.7	515.0	527.8	540.0
Motor vehicles and parts	206.9	218.9	230.0	229.5	231.3
Gasoline and oil	106.6	108.7	109.8	113.1	114.1
Transportation services	158.1	163.1	175.2	185.2	194.6
Gross private domestic investment	89.9	102.2	117.1	122.8	129.8
Transportation structures	3.7	3.9	3.9	3.9	4.8
Transportation equipment	86.2	98.3	113.2	118.9	125.0
Net exports of transportation-related goods and services	–15.5	–26.0	–36.3	–38.7	–38.6
Exports (+)	125.0	122.9	127.4	127.8	133.9
Civilian aircraft, engines, and parts	37.7	31.7	29.7	23.8	27.0
Automotive vehicles, engines, and parts	47.0	52.1	56.7	60.0	62.4
Passenger fares	16.6	16.4	16.4	17.4	18.7
Other transportation	23.7	22.7	24.6	26.6	25.8
Imports (–)	140.5	148.9	163.7	166.5	172.5
Civilian aircraft, engines, and parts	12.6	10.9	10.6	9.8	11.2
Automotive vehicles, engines, and parts	91.8	100.9	112.9	114.8	118.8
Passenger fares	10.6	11.5	13.0	13.9	14.9
Other transportation	25.5	25.6	27.2	28.0	27.6
Government transportation-related purchases	123.4	123.9	127.4	128.0	131.8
Federal purchases	16.8	16.9	17.9	16.1	16.4
State and local purchases	95.3	97.5	101.5	103.6	106.5
Defense-related purchases	11.3	9.5	8.0	8.3	8.8

[1] The Bureau of Economic Analysis derives chained dollars by using the Fisher Ideal Quantity Index to calculate changes between adjacent years. Annual changes are then chained (multiplied) together to form a time series.
[2] Demand for goods and services produced in the United States, regardless of where they are consumed. The measure counts exported goods and services, but does not include imports.
[3] Demand for goods and services consumed in the United States, regardless of where they are produced. The measure counts imported goods and services, but does not include exports.

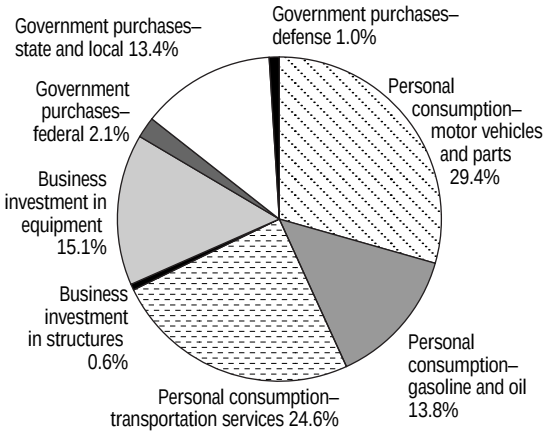
KEY: GDP = Gross Domestic Product; GDD = Gross Domestic Demand.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculated from data in U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, 1997, various issues.

that, until now, national measures of transportation services only counted the value of for-hire transportation, ignoring the sizable contribution of in-house transportation services by nontransportation firms. For example, grocery companies often use their own truck fleets to move goods from their warehouses to their retail outlets. Because the in-house contribution was missing in the national data, the true value of transportation services in the economy was unknown, and, therefore, most estimates of the economic benefits to industry from transportation investments have been too low.

A new accounting tool, called the Transportation Satellite Accounts (TSA), now provides a way to measure both in-house and

Figure 2-1.
Components of Transportation-Related Domestic Demand: 1996



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculated from data in U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business,* 1996–97, various issues.

for-hire transportation services. The TSA, developed jointly by the Bureau of Transportation Statistics (BTS) of the U.S. Department of Transportation and the Bureau of Economic Analysis of the U.S. Department of Commerce, is statistically and conceptually consistent with the national accounts used to calculate GDP. These accounts are based on the five-year Economic Census; 1992 is the most recent year for which complete data are available

The TSA indicated that transportation services contributed about $313 billion, or 5 percent of the value generated by the U.S. economy in 1992. This is roughly comparable to the value-added by the wholesale/retail trade industry or the health industry, and more than the individual shares of the agriculture, mining, and computer industries.

The value-added by in-house transportation services was about $121 billion compared with about $192 billion contributed by for-hire transportation (figure 2-2). The value-added contributed by in-house transportation alone was about the same as education ($120 billion), and more than either the agriculture, mining, or computer industries ($86 billion, $75 billion, and $89 billion, respectively). The method used to calculate the value-added by in-house transportation services has not been applied to most other industries. For example, the value-added when companies use their own staff and facilities to provide in-house educational services to their employees is not included in the education figure cited above.

It is important to note that the TSA measures for-hire and in-house transportation services from the supply side, and is comprised only of services that move people and goods on the transportation system. It should not be confused with the measures of transportation-related final demand described earlier in this chapter.

The importance of including in-house transportation is most notable in trucking, which accounts for 65 percent of the total value-added

Table 2-3.
Gross Domestic Product by Major Societal Function: 1992 and 1996

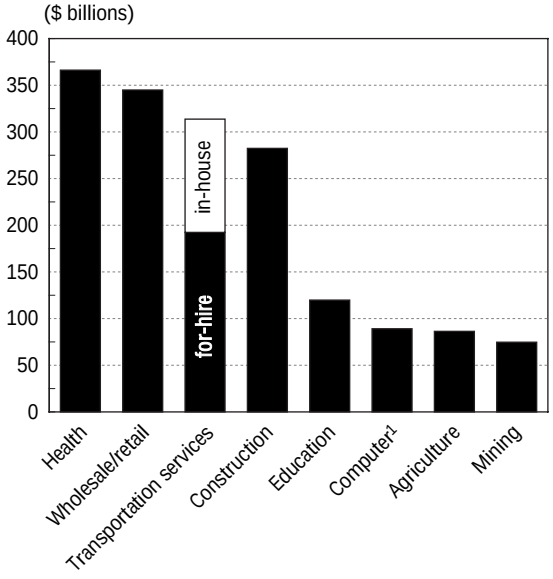
Societal function	1992	1996
Total (billions of current $)	6,244.4	7,636.0
Housing	1,468.7	1,864.3
Health	880.2	1,101.7
Food	803.1	928.6
Transportation	669.4	846.6
Education	427.9	523.5
Other	1,995.0	2,371.3
Percent	100.0	100.0
Housing	23.5	24.4
Health	14.1	14.4
Food	12.9	12.2
Transportation	10.7	11.1
Education	6.9	6.9
Other	31.9	31.1

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculated from data in U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, 1996–97, various issues.

by transportation services. As shown in table 2-4, more than half of trucking contributions were in-house. The next largest contributors to the value-added of transportation services were air transportation and railroads.

Adding in-house transportation changes the view of which industries are most dependent on transportation services. Agriculture, construction, and wholesale/retail trade are the most transportation-intensive sectors, counting both in-house and for-hire services. Although manufacturing is the most intensive user of for-hire transportation services, and also consumes the most transportation services in absolute terms, it ranks below some sectors in overall transportation intensity because other industries rely more heavily on in-house services. Table 2-5 presents transportation services costs for the nine non-transportation sectors of the economy. Each sector is an aggregate of many related industries. On average, agriculture and services industries use about twice as much in-house transportation as they use for-hire transportation services. The ratio of in-house to for-hire transportation was about 3 to 1 in construction, and roughly 5 to 1 in wholesale/retail trade industries.

Figure 2-2.
Value-Added by Selected Industry Sectors: 1992



[1] The computer industry consists of computer and office equipment manufacturing and computer and data processing services.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, April 1998.

Table 2-4.
Transportation Services Value-Added by Mode: 1992

Mode	Value-added ($ billions)	Percent
Total transportation services, adjusted[1]	313.2	
Total transportation services, unadjusted	313.9	100.0
Railroad and ground passenger transportation	34.4	11.0
Water	12.8	4.1
Air	42.2	13.4
Pipeline and other transportation services	19.6	6.3
For-hire trucking and warehousing	83.4	26.6
In-house trucking	120.2	38.3
In-house bus	1.3	0.4

[1] Adjustment is a reduction of $0.7 billion for selected state and local government subsidies to passenger transit.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, April 1998.

Figure 2-3 shows total transportation services costs embodied in a dollar of goods or services purchased by consumers and other end-users in 1992. For example, transportation services costs embodied in construction and agricultural products are larger than that in manufactured products on a per dollar basis.

The TSA documents the critical importance of transportation to specific industries, as well as how changes in industrial output influence transportation demand. For instance, transportation services costs have a greater effect on agricultur-

Table 2-5.
Transportation Services Costs to Establishments in Nontransportation Industries

Industry	In-house services ($ millions)	For-hire services ($ millions)	Total transportation costs ($ millions)	Industry output ($ millions)	Transportation cost per $ output
Total	164,743	151,835	316,578	9,519,471	0.033
Agriculture, forestry, fisheries	13,177	5,720	18,897	237,662	0.080
Mining	3,870	2,810	6,680	156,717	0.043
Construction	38,950	13,286	52,235	679,330	0.077
Manufacturing	21,806	80,248	102,054	2,951,303	0.035
Communication and utilities	1,187	8,803	9,990	520,688	0.019
Wholesale and retail trade	42,819	8,963	51,783	1,091,489	0.047
Services[1]	42,035	21,482	63,517	2,227,550	0.029
Finance, insurance, real estate	899	10,523	11,422	1,654,732	0.007

[1] In the national accounts, these are: hotels and lodging; personal and repair services; computer and data processing services; legal, engineering, and accounting services; business and professional services; advertising; automotive repair services; amusements; health services; education; and social services.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, April 1998.

al product prices and markets than on manufacturing or mining products. A $1 increase in the demand for agricultural products will require 14.2¢ of transportation services, compared with 9.1¢ in the case of manufacturing and about 8¢ for mining.

Transportation will continue to play a key role in the economy, even as the economy shifts from a manufacturing focus to a focus on services. The services sector, as defined in the national accounts, is the largest and fastest growing sector in the U.S. economy. According to the national accounts, demand for for-hire transportation generated from services sector growth between 1992 and 1996 was about $6 billion. TSA data show that the services sector would have used an additional $12 billion of in-house transportation.

These findings suggest that transportation may have a greater influence on the competitiveness of U.S. products in international markets than previously thought, and the economic benefits of transportation infrastructure investments are larger than estimates based on for-hire transportation data alone. Because of the addition of in-house services, transportation comprises a larger share of the total costs of the products and services of many industries than previously estimated in the national accounts. Therefore, improvements in transportation efficiency would have a larger influence on the prices of many products, particularly agricultural products, and their competitiveness in international markets.

The TSA also shows that the economic benefit of investing in transportation infrastructure is larger than shown by estimates based solely on for-hire transportation statistics. To illustrate this point, consider the wholesale/retail trade as a hypothetical example. Assume that investments in transportation infrastructure increase the speed, reliability, and flexibility of transportation, resulting in a 10 percent decrease in the cost of transportation services. If only for-hire data are used to calculate transportation's share of production costs, the 10 percent reduction would translate into a 0.08 percent decrease in wholesale/retail trade production costs, or a 0.08 percent increase in its productivity. In reality,

wholesale/retail trade would benefit more from a 10 percent fall in transportation costs. Its production costs would decline by 0.47 percent, and its productivity would increase by 0.48 percent, six times more than estimated using for-hire transportation statistics only.

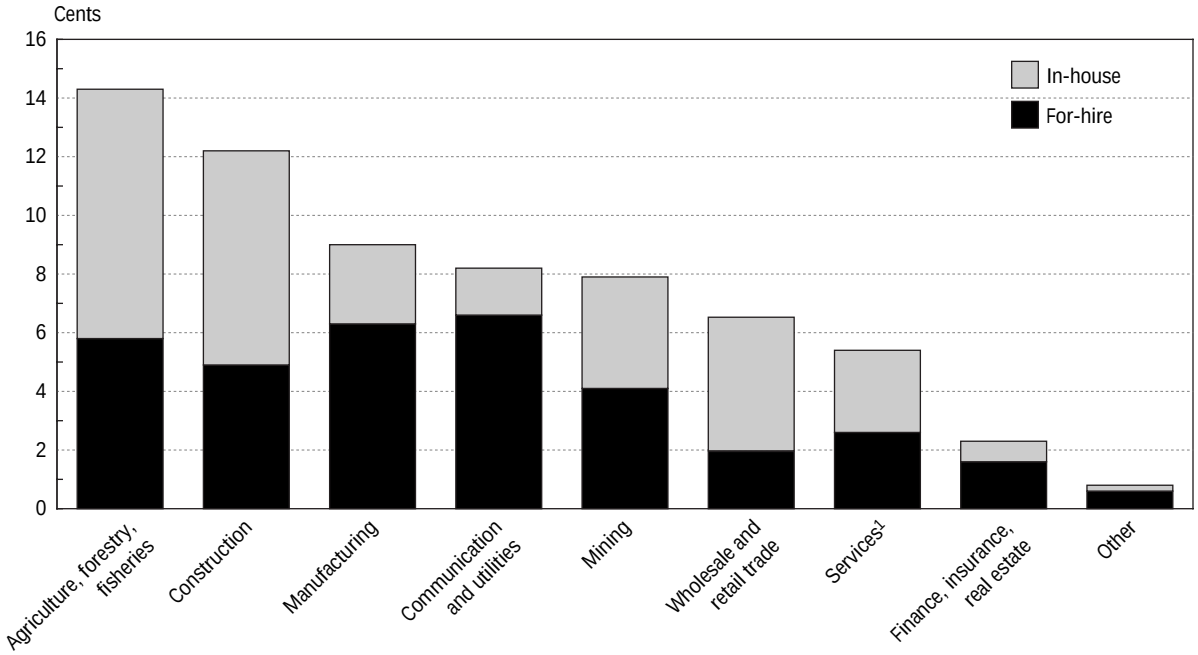
Although the TSA demonstrates that transportation services command a much larger role in the economy than previously understood, the expanded picture is still incomplete. Some in-house transportation services, such as the use of corporate aircraft, have not yet been measured. Also, the TSA does not fully reflect the economic role of personal transportation in getting people to work or school, in bringing goods home from retail outlets, and in supporting social and recreational activities.

CONSUMER EXPENDITURES FOR TRANSPORTATION[3]

In 1995, the average American household spent about $6,000 on transportation, accounting for 18.6 percent of total expenditures (see table 2-6). This appears to be a slight decrease from the previous year, the first year since 1991 that expenditures had not increased compared with the previous year. This also marks the first time that American households, on average, spent more on purchasing used cars and trucks than on new ones. Another trend in American household transportation expenditures is the substantial

[3] In this section, BTS has not checked explicit or implicit comparisons for statistical significance.

Figure 2-3.
Total Transportation Services Costs Embodied in a Dollar of Goods and Services Purchased by Consumers and Other End-Users: 1992



[1] In the national accounts, these are: hotels and lodgings; personal and repair services; computer and data processing services; business and professional services; legal, engineering, and accounting services; advertising; automotive repair services; amusements; health services; education; and social services.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, April 1988.

increase in spending on leased vehicles. In 1991, for example, American households, on average, spent $63 on leased vehicles, which accounted for 1.2 percent of total transportation expenditures. In 1995, this expenditure was $198, more than triple the amount spent in 1991.

Regional Differences

Household transportation expenditures vary from region to region in both the amount of money spent and the component shares of the expenditures. Historically, because of differences in geographic conditions, population density, land-use patterns, industry mix, and household income, households in the West, on average, spent more on transportation than households in the Midwest, South, and Northeast. Among the four regions, the Northeast, on average, spent the least on transportation. In 1984, for example, the average household transportation expenditures were nearly $4,000 in the Northeast, and about $4,800 in the West. In terms of growth rate, since 1984 household transportation expenditures in the Midwest and South increased faster than in the West and the Northeast. In 1995, the average household transportation expenditures in the Midwest reached almost $6,400, the highest among the four regions. (USDOL BLS 1995 and 1996).

Proportionally, households in the South and Midwest spent more money on the purchase of vehicles and related finance charges, while households in the Northeast and West spent more on vehicle insurance and purchased transportation services. In 1995, the share of expenditures on purchasing vehicles and related finance charges in household annual transportation expenditures was just over 50 percent in the South and Midwest, but only 43 percent in the Northeast and the West. The share of vehicle insurance in household transportation expenditures was about the same in all regions. Purchased transportation services accounted for a larger portion of household transportation expenditures in the Northeast (9 percent) and the West (7 percent) than in the Midwest (5 percent) and the South (5 percent) (USDOL BLS 1996).

Table 2-6.
Household Transportation Expenditures: 1995

Type of expenditure	1995
Average annual household transportation expenditures (in current $)	$6,016
	Percentage of components
Vehicle purchases	43.9
Cars and trucks, new	19.8
Cars and trucks, used	23.5
Other vehicles	0.6
Gasoline and motor oil	16.7
Other vehicle expenses	33.5
Finance charges	4.3
Maintenance and repairs	10.9
Insurance	11.8
Vehicle rental, lease, license, and other charges	6.5
Purchased transportation service	5.9

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey, 1995 and 1996.

Rural and Urban Households

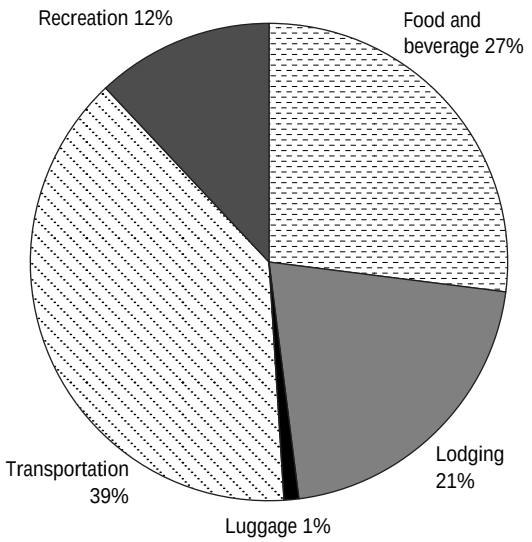
Data on the relative amount of transportation expenditures by rural and urban households suggest considerable fluctuation over time. In the 1984 to 1991 period, annual expenditures of rural households, on average, were always 15 to 20 percent lower than those of urban households. Transportation expenditures of rural households, however, were higher than those of urban households from 1992 to 1995. The most recent data show, however, that the gap between rural and urban spending narrowed to less than 1 percent between 1994 and 1995 (USDOL BLS 1995 and 1996). It is too early to tell whether this change is a temporary aberration or a fundamental shift.

Two important differences between rural and urban household transportation expenditures remained in 1995. One was that the share of transportation spending of total household expenditures, on average, was higher in rural households. The other was that spending on vehicles continued to account for a larger proportion of total transportation expenditures among rural households (22 percent for rural and 18 percent for urban). Since the automobile is the only mode of day-to-day transportation for most rural households, it is not surprising that a larger share of their transportation expenditures is on vehicles. In 1995, vehicle purchases and related finance charges, on average, accounted for 55 percent of rural household transportation expenditures, but only 47 percent for urban households. Rural households on average spent almost $1,200, or 20 percent of their transportation expenditures, on gasoline and motor oil in 1995, compared with an average of about $1,000 for urban household spending, or 16 percent (USDOL BLS 1996).

Expenditures on Out-of-Town Trips[4]

When Americans travel out-of-town, they spend the largest portion of household travel expenditures on transportation—over $400 or 39 percent (USDOL BLS 1996). In terms of total annual household expenditures, households spent about $1,000 on out-of-town trips.[5] Figure 2-4 shows the 5 major components of household expenditures on out-of-town trips (USDOL BLS 1996).

Figure 2-4.
Household Expenditures on Out-of-Town Trips by Category: 1995



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculated based on data from U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey, 1995.

As for specific items making up household transportation spending on out-of-town trips, air transportation expenditures accounted for the lion's share, followed by gasoline and motor oil. In 1995, these two subcategories together accounted for about three-quarters of the total (54 percent for air transportation and 20 percent for gas and motor oil), followed by expenditures on vehicle rental (7 percent), boat fare (6.5 percent), intercity train transportation (4.4 percent), intercity bus transportation (3.4 percent), and taxis and local transit (3.2 percent). Tolls and parking fees were about 2 percent of the total (USDOL BLS 1996).

Between 1984 and 1995, annual household expenditures on vehicle rental, intercity train transportation, and taxis and local transit on trips increased by 12.5 percent, 11 percent, and 7.6 percent, respectively. During this period, household expenditures on air transportation increased more slowly, at a rate of 2.1 percent

[4] The following section does not include employee-reimbursed business travel.

[5] This refers to goods and services that are purchased and consumed for travel out-of-town. These expenditures may be incurred before or during the trip, e.g., airline tickets are purchased before a trip, but the services are consumed during the trip. Sunk costs on durable goods that are used for out-of-town trips, such as expenditures on an owned vacation home, cars, trailers, motorized campers, and other recreation vehicles, are excluded.

per year, while expenditures on gasoline for out-of-town trips actually decreased at a rate of 2 percent annually. Because air transportation and gasoline expenditures accounted for large shares of the total, they carried more weight in the calculation of the annual growth rate of household transportation expenditures on out-of-town trips, which was 2.4 percent (USDOL BLS 1996).

Gasoline and motor oil was the only subcategory for which household expenditures decreased between 1984 and 1995. This decrease reflected an improvement in vehicle fuel efficiencies and lower fuel prices (USDOT BTS 1997a).

GOVERNMENT TRANSPORTATION REVENUES AND EXPENDITURES

In fiscal year (FY) 1994, governments at the federal, state, and local levels spent $124.5 billion on the nation's transportation system, accounting for 1.8 percent of U.S. GDP (USDOT BTS 1997b). Government spending on transportation is partially financed by revenues generated from government transportation-related user charges, taxes, or fees and earmarked for transportation expenses. By this definition, funds generated from transportation-related sources but not used for transportation purposes are not considered transportation revenues (e.g., motor fuel taxes designated for deficit reduction). Also, funds not generated from transportation-related sources, even though earmarked for transportation purposes, are not included in transportation revenues (e.g., general tax revenue used to defray transportation infrastructure costs). In comparison, government transportation expenditures are defined much more inclusively as the final actual costs to all levels of governments for providing transportation infrastructure, equipment, and operating services covered by government transportation programs, regardless of what funds are used to defray the costs. Because of this difference in definitions, annual government transportation revenues are usually smaller than government transportation expenditures.

The following discussion presents 1994 data, the most recently available for all levels of government, and shows annual growth rates for one year (1993 to 1994) and 10 years (1984 to 1994).

Revenues

In FY 1994, government transportation revenues totaled $86 billion (current dollars), covering 69 percent of government transportation expenditures in the same year (see table 2-7). The federal government collected about 30 percent of these revenues, while states collected 50 percent, and local governments the rest. From a modal perspective, highways generated 71 percent of transportation revenues in FY 1994. Air transportation ranked second, contributing 15 percent of the total, while transit and water transportation contributed 10 percent and 4 percent, respectively. Pipelines provided less than one-half percent of the total (USDOT BTS 1997b).

Government transportation revenues in FY 1994 were only about 1 percent higher than in FY 1993, primarily because revenues collected by the federal government fell by 6.4 percent between those two years. Between FY 1984 and FY 1994, government transportation revenues grew much more—6.2 percent annually on average. State government transportation revenues grew at a slower pace—3.5 percent between 1993 and 1994, about half its average annual growth rate between FY 1984 and FY 1994. Only local government transportation revenues maintained their growth trend between 1993 and 1994 (USDOT BTS 1997b).

By mode, government transportation revenues collected from water transportation decreased 3.6 percent between FY 1993 and FY 1994. Revenues from highways increased by only one-half percent, less than one-tenth of its average

annual growth rate between 1984 and 1994. Air and transit are the two modes whose contributions to government transportation revenues increased substantially (3.1 percent and 4.5 percent, respectively) between 1993 and 1994. Compared with previous growth trends, however, the increases were relatively small. Percentagewise, government transportation revenues from pipelines posted a large increase (26.7 percent) between 1993 and 1994, but in absolute terms, the increase was small as pipelines contributed only $19 million to government transportation revenues in 1994 (USDOT BTS 1997b).

Expenditures

Government expenditures on transportation increased steadily between 1984 and 1994, with an above average increase between FY 1993 and FY 1994. Federal, state, and local governments together spent $124.5 billion (current dollars) on the nation's transportation system in FY 1994 (see table 2-8). Of this total, state governments spent 40 percent and local governments, 48 percent. In contrast with the small increase in transportation revenues, expenditures in 1994 were up 7.3 percent over that in 1993. This increase was appreciably higher than its 6.1 percent average annual growth rate during the 1984 to 1994 period. In particular, local government transportation expenditures grew 9.7 percent between FY 1993 and FY 1994, a significant increase in light of local governments' already large share of total government transportation expenditures. The growth rate of the federal government's direct transportation expenditures was 9.0 percent between FY 1993 and FY 1994. State government transportation expenditures increased the least among all levels of government, only 4.1 percent between FY 1993 and FY 1994—much lower than its 6.2 percent average for the 1984 to 1994 period (USDOT BTS 1997b).

Table 2-7.
Government Transportation Revenues: Fiscal Year 1994

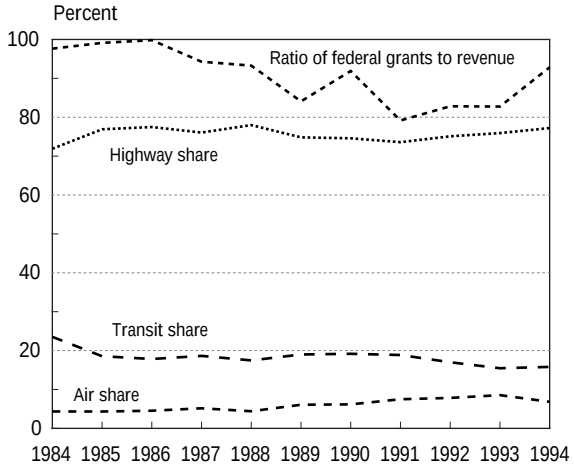
	Revenues after transfers (millions of current $)	Share in total (percent)	Annual growth rate (percent) 1993–94	1984–94
Total	85,978	100.00	1.1	6.2
By level of government				
Federal	25,552	29.70	–6.4	4.6
State	42,861	49.90	3.5	6.7
Local	17,565	20.40	7.8	7.9
By mode				
Highway	60,724	70.60	0.5	5.8
Air	13,101	15.20	3.1	8.5
Transit	8,947	10.40	4.5	5.7
Water	3,179	3.70	–3.6	7.7
Pipeline	19	0.02	26.7	U
Unallocated	7	0.01	–30.0	U

U = data for 1984 are not available.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal, State, and Local Transportation Financial Statistics, Fiscal Years 1982–94* (Washington, DC: 1997).

For the 1984 to 1994 period, the federal government collected more in transportation revenues than it spent directly on transportation. A large portion of federal transportation revenues was transferred to state and local governments as transportation grants, which were then counted in the transportation expenditures of state and local governments. In FY 1994, federal transportation grants totaled $23.7 billion, equivalent to 93 percent of the federal government's transportation revenues in the same year. The lion's share of federal grants was spent on highway-related programs. Specifically, 77 percent of federal transportation grants went to highways in FY 1994 (see figure 2-5). Transit was the second largest recipient of federal transportation grants, accounting for 15.8 percent in FY 1994. Air transportation was next, receiving 6.8 percent of the total, followed by rail and pipelines with only 0.12 percent and 0.03 percent, respectively, in FY 1994.

Figure 2-5.
Federal Transportation Grants and Modal Shares: 1984–94



NOTE: Rail and pipeline are not included as their share is too small to show. Waterborne transportation is not included, because it does not receive a federal grant.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal, State, and Local Transportation Financial Statistics, Fiscal Years 1982–94* (Washington, DC: 1997).

Table 2-8.
Government Transportation Expenditures After Transfers: Fiscal Year 1994

	Expenditures (millions of current $)	Share in total (percent)	Annual growth rate (percent) 1993–94	1984–94
Total	124,471	100.0	7.3	6.1
By level of government				
Federal	15,342	12.3	9.0	4.0
State	49,738	40.0	4.1	6.2
Local	59,392	47.7	9.7	6.6
By mode				
Highway	74,531	59.9	6.8	6.2
Air	17,940	14.4	3.2	9.3
Transit	24,242	19.5	11.8	6.0
Water	6,491	5.2	7.9	4.2
Rail	844	0.7	3.5	–10.4
Pipeline	36	0.0	5.7	15.0
Unallocated	387	0.3	16.2	10.9

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal, State, and Local Transportation Financial Statistics, Fiscal Years 1982–94* (Washington, DC: 1997).

Highway grants as a share of total federal transportation grants fluctuated over the 1984 to 1994 period. This share increased from FY 1984 to FY 1988, decreased to a low point (73.6 percent) in FY 1991, then increased again between FY 1991 and FY 1994. Transit's share decreased from 19 percent in FY 1991 to 15.8 percent in FY 1994. The share of air transportation in federal transportation grants increased steadily from FY 1984 (4.3 percent) to FY 1993 (8.5 percent), but dipped in FY 1994 (USDOT BTS 1997b).

Transit led all modes in the growth of total government transportation expenditures between FY 1993 and FY 1994, increasing by 11.8 percent. This increase bumped transit's share in total government transportation expenditures from 18.7 percent in FY 1993 to 19.5 percent in FY 1994. Water transportation was another mode for which government expenditures increased faster between FY 1993 and FY 1994 than total government transportation expenditures. As a result, its share in total government transportation expenditures increased slightly to 5.2 percent in FY 1994 (USDOT BTS 1997b).

Although highway expenditures have consistently accounted for a dominant share of government transportation expenditures, they have grown more slowly than other modes in recent years. Between FY 1993 and FY 1994, highway expenditures increased 6.8 percent, a slightly lower rate of increase than that of total government transportation expenditures. Although the share of highway expenditures in the total consequently decreased only 0.2 percent, FY 1994 was the first year since 1984 in which the share of highway expenditures in total government transportation expenditures was lower than 60 percent (USDOT BTS 1997b).

Government air transportation expenditures showed the least growth among the modes from FY 1993 to FY 1994. At 3.2 percent, this was less than half the rate of increase of total government expenditures in that period. Yet, before FY 1994, air transportation had been one of the fastest growing modes in terms of government expenditures, with an average annual growth rate of 9.3 percent. FY 1994 was the first year since 1984 in which the growth rate of government expenditures on air transportation was lower than 7 percent. The slower than average growth dropped the share of air transportation in total government transportation expenditures from 15 percent in FY 1993 to 14.4 percent in FY 1994. Over the 10-year period, rail was the only mode that reported a significant decrease in its growth rate. Between FY 1993 and FY 1994, government expenditures on rail transportation increased 3.5 percent (USDOT BTS 1997b).

► Investment

In the United States, government expenditures on transportation have become more concentrated on investment, particularly infrastructure investment.[6]

Total government investment in transportation was $54.9 billion (current dollars) in FY 1994. About 84 percent, or $45.9 billion (current dollars), of this total was spent on infrastructure (see table 2-9). The remaining portion was used to purchase transportation equipment, such as motor vehicles, airplanes, and traffic control systems. When viewed by mode, highway accounted for the largest share of government investment in infrastructure (more than 88 percent), followed by air (82 percent), and transit (70 percent) in FY 1994 (USDOC Census 1997). Private investments in transportation infrastructure predominated in railroads and pipelines.

[6] Investment is defined here as expenditures on fixed assets. Transportation investments are expenditures on fixed transportation assets, such as highways, railroads, ports and airports, transportation equipment, and traffic signal and control systems.

Table 2-9.
Government Investment in Transportation Infrastructure: Fiscal Year 1994

	Infrastructure investment (millions of current $)	Shares (percent)	Share in total transportation fixed investment (percent)	Annual growth rate (percent) 1993–94	1984–94
Total	45,860	100.0	83.5	10.6	7.4
Highways	35,013	76.3	88.2	8.5	7.0
Air transportation (airports)	4,972	10.8	81.8	6.0	11.5
Transit	4,820	10.5	69.2	37.9	9.1
Water transportation and terminals	937	2.0	47.4	3.2	–0.01
Parking facilities	118	0.3	70.7	–4.0	U

U = data for 1984 are not available.

SOURCES: U.S. Department of Commerce, Bureau of the Census, *Government Finances 1983-84* (Washington, DC: 1984); U.S. Department of Commerce, Bureau of the Census, Government Finances 1993–94, working files, 1997.

In 1994, more than three-quarters of infrastructure investment went to new highway construction and major improvements to or replacement of existing highways. Airport construction ranked second on the government transportation infrastructure spending list, accounting for 11 percent of the total. Government spending on transit construction was slightly lower than on airport construction, but still accounted for more than 10 percent of the total. The remainder was shared by water transportation and terminals (2 percent) and parking facilities (less than 1 percent).

From 1984 to 1994, government investment in transportation doubled, with an annual growth rate of 7.1 percent. Government investment in transportation infrastructure increased even faster, with an annual growth rate of 7.4 percent between 1984 and 1994. Air transportation was the mode in which government infrastructure investment grew most in the 10-year period, tripling in amount over that time. During this time, average annual growth rate of government investment in airports and related facilities was 11.5 percent (USDOC Census 1984 and 1997). Government investment in transit infrastructure also increased faster than average: 9.1 percent annually between 1984 and 1994. Government investment in water transportation facilities showed a general decline during this period, particularly when inflation is taken into account. A 38 percent increase in government investment in the nation's transit systems between 1993 and 1994, boosted transportation infrastructure's growth rate to 10.6 percent, significantly higher than its average in the 1984 to 1994 period (USDOC Census 1997).

TRANSPORTATION EMPLOYMENT

Transportation contributes to the economy by providing jobs and generating income. The number of transportation-related jobs can be calculated by industry and by occupation. Employment in the transportation industry covers all workers hired by for-hire transportation industries, including some nontransportation jobs, such as personnel managers and accountants. Employment in transportation occupations includes only transportation jobs regardless of industry. For example, truck drivers working in the retail industry would be counted. It is important to note that employment numbers for transportation occupations dif-

fer from those for the transportation industry, though there is substantial overlap between the two, with transportation occupations accounting for a large portion of transportation industry employment.

The Bureau of Labor Statistics (BLS), reported that in 1996 the for-hire transportation industry employed about 4 million people and employment in transportation occupations reached nearly 4.5 million, accounting for 3.2 percent and 3.5 percent, respectively, of total U.S. employment. Between 1986 and 1996, total U.S. employment increased from 108 million to 127 million, with an average annual growth rate of 1.6 percent. In comparison, for-hire transportation industry employment grew much faster, averaging 2.8 percent annually. The faster growth rate boosted the for-hire transportation industry's share of total employment from 2.8 percent in 1986 to 3.2 percent in 1996. Employment in transportation occupations, however, grew at about the same rate as total U.S. employment. The difference between industry and occupation growth rates implies that in recent years transportation occupations have become more concentrated in the for-hire transportation industry, or the share of nontransportation jobs in the for-hire transportation industry has increased (USDOL BLS 1984–97 and 1998a).

Within the for-hire transportation industry, air transportation employment has grown the most rapidly. Its average annual growth rate between 1986 and 1996 was 7.2 percent, two and one-half times the average of transportation as a whole (see table 2-10). Consequently, air transportation's share in total for-hire transportation industry employment increased from 16 percent in 1986 to 28 percent in 1996. The other two fast growing for-hire transportation industries were transit and transportation services.[7] Their average annual growth rates in the 1986 to 1996 period were 4.4 percent and 3.9 percent and their shares in the employment of the overall for-hire transportation industry increased from 9 percent to 11 percent and to 10 percent, respectively. Trucking and warehousing employment grew more slowly, and its share in

[7] Earlier in this chapter, transportation services included carriers, in-house transportation providers, and supporting activities, such as travel agents and freight forwarders. In this section, services refer to the more restrictive definition in table 2-10.

Table 2-10.
Employment in the For-Hire Transportation Industry: 1996

	Employment (in thousands)	Shares (percent)	Annual growth rate (percent)	
			1995–96	1986–96
Total	4,038.0	100.0	3.4	2.8
Trucking and warehousing	1,640.9	40.6	3.4	1.7
Air	1,122.1	27.8	5.0	7.2
Local and intercity passenger transit	439.2	10.9	4.8	4.4
Transportation services[1]	417.3	10.3	4.0	3.9
Rail	231.1	5.7	–3.1	–3.5
Water	173.1	4.3	–0.8	–0.1
Pipeline, except natural gas	14.5	0.4	–4.0	–2.2

[1] Includes establishments furnishing services incidental to transportation, such as forwarding and packing services, and arrangements for passenger and freight transportation.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Employees on Nonfarm Payrolls by Industry," available at www.bls.gov/webapps/legacy/cesbtab1.htm, cited on 5 February 1998.

total for-hire transportation industry employment decreased from 45 percent to 41 percent. During the same period, railroad, water, and pipeline employment decreased. Among the three, railroad transportation declined the most, averaging a decrease of 3.5 percent annually. Not surprising, railroad's share in total for-hire transportation industry employment dropped from 11 percent in 1986 to less than 6 percent in 1996 (USDOL BLS 1998a).

The modal structure of employment in transportation occupations differs from that of the transportation industry. Motor vehicle operators, which include truck, bus, and taxi drivers, accounted for 90 percent of transportation jobs in 1996 (see table 2-11). Air, rail, and water transportation jobs—such as airplane pilots, navigators, attendants, and air traffic controllers; railroad conductors, locomotive operators, and railroad brake, signal, and switch operators; and ship captains, sailors, and marine engineers—together accounted for less than 10 percent of the total transportation jobs. A comparison of tables 2-10 and 2-11 shows that employment numbers for air, rail, and water transportation occupations were much smaller than the total number employed in each corresponding industry. In contrast, the number of motor vehicle operators is more than double that of the trucking and warehousing industry, a reflection of the fact that motor vehicle (or highway) transportation is extensively diffused throughout the economy. The for-hire trucking industry accounts for a smaller share of the total number of motor vehicle operators than do industries whose primary economic activities are not transportation (USDOL BLS 1984–97).

Over the 1986 to 1996 period, changes in the employment numbers in transportation occupations were similar to that of for-hire transportation industries. The number employed in air transportation occupations grew most rapidly, while the number in rail occupations decreased. Between 1995 and 1996, the number employed in transportation occupations grew 3.3 percent, much faster than its 1.7 percent average annual rate during the 1986 to 1996 period. In particular, employment in rail transportation occupations reversed its 10-year declining trend with an 11.5 percent increase between 1995 and 1996 (USDOL BLS 1984–97).

Table 2-11.
Employment in Transportation Occupations: 1996

	Employment (in thousands)	Shares (percent)	Annual growth rate (percent)	
			1995–96	1986–96
Total	4,451	100.0	3.3	1.7
Motor vehicle operators	4,024	90.4	3.2	1.8
Air transportation occupations	241	5.4	1.3	2.7
Rail transportation occupations	116	2.6	11.5	–2.1
Water transportation occupations	70	1.6	6.1	1.6

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Employment and Earnings," table 11 of the Annual Average Tables, January issues 1984–97.

LABOR PRODUCTIVITY AND CONSUMER PRICE INDEX

Labor Productivity

Among transportation industries, rail has been the leader in labor productivity growth (measured in output per hour worked), increasing 4.3 percent between 1992 and 1993 (the latest year for which data are available). Rail also outperformed the manufacturing sector between 1982 and 1993; rail labor productivity grew 150 percent, while manufacturing labor productivity increased 35 percent (see figure 2-6) (USDOL BLS 1998b and 1998c).

In comparison, labor productivity growth in air transportation and petroleum pipelines was slower and less steady. For example, between 1982 and 1986, both air transportation and petroleum pipeline labor productivity grew 21 percent, faster than that of the manufacturing sector. Air transportation labor productivity continued to grow, while petroleum pipeline labor productivity decreased between 1986 and 1987. Because of the decreases in output caused by a slowdown in the U.S. economy from 1988 to 1991, air and pipeline productivity decreased 7 percent and 6 percent, respectively. After 1991, labor productivity of both industries rose again. Between 1982 and 1995, both air and pipeline labor productivity grew 40 percent, which was slightly lower than that of the manufacturing sector (43 percent), but much higher than that of the overall economy (18 percent) (USDOL BLS 1998b and 1998c).

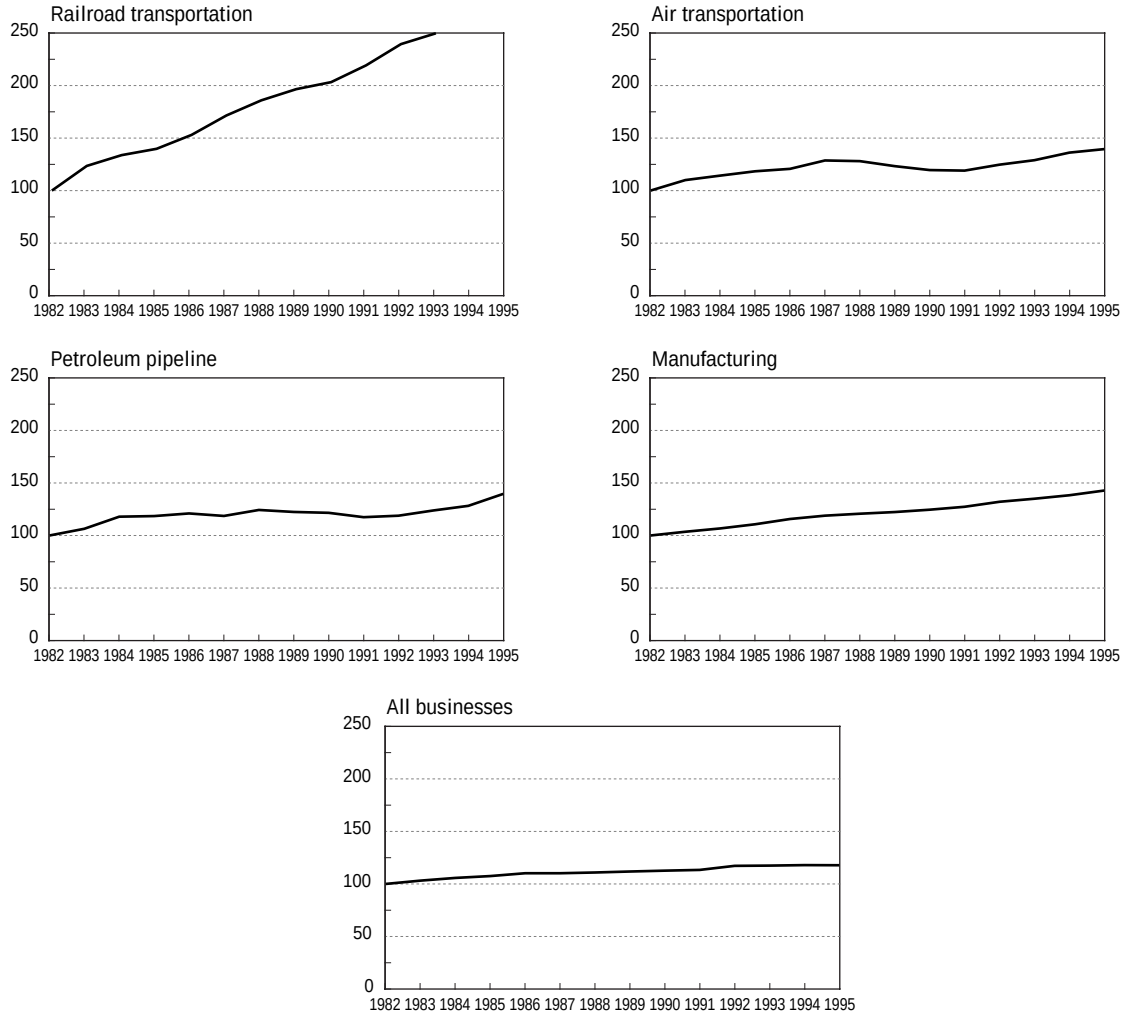
Transportation Statistics Annual Reports 1995 and *1997* discussed changes in trucking and bus labor productivity up to 1989. Post-1989 labor productivity data for these two industries and water transportation are not available from BLS.

Consumer Price Index

An increase in productivity often translates into lower prices for products and services, or a slower rate of increase in prices than otherwise would be expected due to general inflation. Figure 2-7 presents consumer price indexes for major categories of goods and services for the 1982 to 1997 period. The average consumer price for transportation carriers and supporting service providers was 43 percent higher in 1996 than was reported for the 1982 to 1984 base period. In comparison, the average price of all consumer goods and services was 57 percent higher in 1996 than in the base period. Although the average price of transportation increased, it cost 25 percent less in 1996 relative to the base period if the price of other goods and services are taken into consideration (USDOL BLS 1998d).

Between 1982 and 1985, the average price of transportation services increased at about the same rate as the average price of all consumer goods and services. From 1986 to 1994, the increase in the average price of transportation services was the lowest among the five major categories of consumer goods and services. After 1994, the increase in the average price of transportation services had risen to that of the apparel category, but was still considerably lower than that of food and housing.

Figure 2-6.
Labor Productivity Indices: 1982–95
Index: 1982 = 100

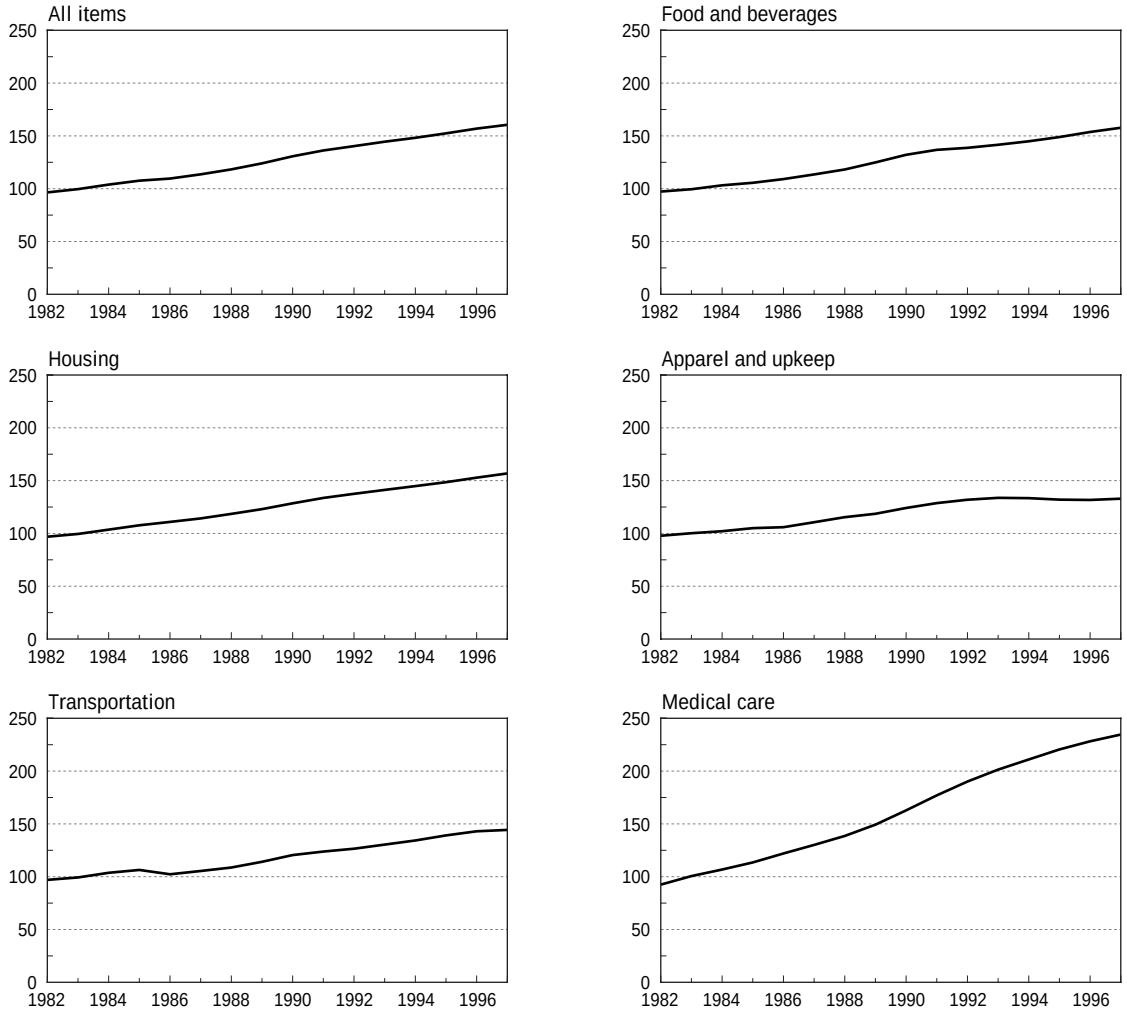


NOTE: The latest data for railroad transportation are for 1993. For air transportation, labor productivity index is based on output per employee.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Major Sector Productivity and Cost Index" and "Industry Productivity Index," available at http://stats.bls.gov/top20.html, cited as of February 1998.

Figure 2-7.
Consumer Price Indices for Major Categories of Goods and Services: 1982–97
(All urban consumers)

Index 1982–84 = 100



NOTE: Three years (1982–84) are used as a reference period for the price index. The average expenditure over three years is more stable than that of one year, and hence may be a better base for trend analysis.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Price Index–All Urban Consumers," available at http://stats.bls.gov.top20.html, cited as of February 1998.

REFERENCES

U.S. Department of Commerce (USDOC), Bureau of the Census. 1984. *Government Finance 1983–84*. Washington, DC.

_____. 1997. Government Finances 1993–94. Working files.

U.S. Department of Commerce (USDOC), Bureau of Economic Analysis (BEA). 1997. *Survey of Current Business*. Various issues.

U.S. Department of Labor (USDOL), Bureau of Labor Statistics (BLS). 1984–97. Employment and Earnings, table 11 of the Annual Average Tables. January issues.

_____. 1995. Consumer Expenditure Survey.

_____. 1996. Consumer Expenditure Survey.

_____. 1998a. Employees on Nonfarm Payrolls by Industry. Available at http://www.bls.gov. Cited as of 5 February.

_____. 1998b. Industry Productivity Index. Available at http://stats/bls.gov/top20.html. Cited as of February 1998.

_____. 1998c. Major Sector Productivity and Cost Index. Available at http://stats.bls.gov/top20.html. Cited as of February 1998.

_____. 1998d. Consumer Price Index—All Urban Consumers. Available at http://stats.bls.gov/top20.html. Cited as of February 1998.

U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS). 1997a. *Federal Gas Tax: Household Expenditures from 1965 to 1995*, BTS/97-TS/2. Washington, DC.

_____. 1997b. *Federal, State, and Local Transportation Financial Statistics, Fiscal Years 1982–94*. Washington, DC.